

SAMPLING WITHIN ALGORITHMIC RECURSIONS

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We consider the context of algorithmic recursions that involve quantities that need to be estimated using simulation. A typical example is the stochastic approximation type recursion where the displacement term (or “Newton decrement”) at any iteration involves possibly estimating the Jacobian and Hessian of an underlying function. Within such contexts, we trade-off the deterministic error due to recursion with the “stochastic” error due to sampling. The analysis yields a characterization of the amount of sampling that should be done in such algorithmic processes to ensure consistency, and more interestingly, efficiency. The analysis is aimed at guiding recursions that dynamically sample based on the history of the process, examples of which we will discuss if time permits.